

II. Remarks

Support for the various amendments made to the claims herein may be found throughout the application as filed. Claims 1 and 3-14 remain pending in the present application, claim 2 being cancelled herein, claims 15-19 having been cancelled previously. Claims 1, 8 and 13 are amended herein.

On January 22, 2007 the Examiner issued an Office Action, wherein Claim 2 was objected to, and all of the then still-pending claims were rejected under 35 U.S.C. Section 103(a) as being obvious over and in view of various combinations of the Ishinaga, Kyocera, Zou and Huang references. Claim 2 is cancelled above, and detailed responses to the forgoing rejections are set forth below.

III. Rejections of Claims Made in the Office Action

In the communication from the Examiner mailed January 22, 2007, the Examiner objected to and rejected claims on the following bases:

- (1) Claim 2 was objected to under 37 CFR 1.75(c) as being of improper dependent form;
- (2) Claims 1-3, 5-6, 8-9, 11-12 and 14 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over U.S. Patent No. 6,355,946 to Ishinaga in view of Japanese Patent Publication No. 2002232017 to Kyocera;
- (3) Claim 4 and 10 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over U.S. Patent No. 6,355,946 to Ishinaga in view of Japanese Patent Publication No. 2002232017 to Kyocera and further in view of U.S. Patent No. 6,186,649 to Zou et al.; and
- (4) Claims 7 and 13 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over U.S. Patent No. 6,355,946 to Ishinaga in view of Japanese Patent Publication No. 2002232017 to Kyocera and further in view of U.S. Patent No. 6,715,901 to Huang.

Each of the foregoing rejections is responded to below, where each response references the number corresponding to each rejection set forth above.

IV. Responses to Objections and Rejections Made in the First Office Action

- (1) Claim 2 is cancelled herein, rendering moot the Examiner's objection thereto.

Claim 2 is cancelled herein, rendering moot the Examiner's objection thereto.

- (2) Claims 1, 3, 5-6, 8-9, 11-12 and 14 as amended herein are not obvious over Ishinaga in view of Kyocera

In rejecting claims 1-3, 5-6, 8-9, 11-12 and 14 as being obvious over Ishinaga over Kyocera, the Examiner stated:

Regarding claim 1, Ishinaga discloses a standalone light emitting diode package (abstract) comprising a housing comprising sidewalls (Fig. 1) and a substrate (reference number 1), the sidewalls and the substrate defining a cavity having a bottom (Fig. 1, see bottom portion of dotted lines), die substrate being located at the bottom of the cavity (Fig. 1, reference number 1), portions of the substrate engaging or being adjacent to the sidewalls (Fig. 2, see elliptical dotted line in the middle), the substrate being formed of ceramic (column 3, lines 50-55), at least one light-reflective metallic coating disposed over at least portions of the substrate (column 3, lines 65-68), a light emitting diode mounted on or in the substrate (abstract, Fig. 1), and optically transparent material disposed in the cavity and covering the light emitting diode (column 4, lines 25-30), wherein the ceramic composition of the substrate and the composition of the sidewalls and the light-reflective coating cooperate to minimize light leakage through or into

the housing when the light emitting diode is energized (column 4, lines 55-65), the metallic coating reflects light incident thereon in a predetermined direction (column 3, lines 65-68, and Fig. 1), and the optically transparent material protects the light emitting diode (column 4, lines 25-30). Ishinaga does not disclose substantially vertical ceramic sidewalls or a metallic coating disposed over at least portions of the sidewalls.

Kyocera discloses substantially vertical sidewalls (Fig. 4, reference number 33), the substantially vertical sidewalls being formed of ceramic (English abstract), and at least one light-reflective metallic coating disposed over at least portions of the sidewalls (Fig. 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the configuration of Kyocera in the apparatus of Ishinaga to make the apparatus produce more light. See the English abstract of Kyocera,

Concerning claim 2, this claim fails to narrow claim 1 and is rejected for the reasons disclosed in the analysis of claim 1.

Regarding claims 3 and 9, Ishinaga discloses the cavity being substantially white in color (column 4, lines 30-35).

Concerning claim 5 and 11, Ishinaga discloses the metallic coating being comprising gold (column 3, lines 65-68, Fig. 1).

Regarding claims 6 and 12, Ishinaga discloses die metallic coating being formed by plating (column 3, lines 65-68).

Regarding claim 8, Ishinaga discloses a housing having sidewalls (Fig. 1) and a substrate (reference number 1), the sidewalls and the substrate defining a cavity having a bottom (Fig. 3, lower middle), the substrate being located at the bottom of the cavity (Fig. 1), portions of the substrate engaging or being adjacent to the sidewalls (Fig. 1), the substrate being formed of ceramic (column 3, lines 50-55), at least one light-reflective metallic coating being disposed over at least portions of the substrate (column 3, lines 65-68, Fig. 1), a light emitting diode being mounted on or in the substrate (abstract, Fig. 1, reference number 3A), an optically transparent material being

disposed in the cavity and covering the light emitting diode (column 4, lines 25-30), the ceramic composition of the substrate and the composition of the sidewalls and the light-reflective coating cooperating to minimize light leakage through or into the housing when the light emitting diode is energized (column 4, lines 55-65), the metallic coating reflecting light incident thereon in a predetermined direction (column 3, lines 65-68, and Fig. 1), and the optically transparent material protecting the light emitting diode (column 4, lines 25-30), the method comprising providing the housing (Fig. 1), coating at least portions of the substrate with a light-reflective metallic coating (column 3, lines 65-68), mounting the light emitting diode on or in the substrate (Fig. 1, abstract) and depositing the optically transparent material in the cavity (column 4, lines 25-30). Ishinaga does not disclose substantially vertical sidewalls with a metallic coating or the step of coating the sidewalls with the at least one light-reflective metallic coating.

Kyocera discloses substantially vertical sidewalls (Fig. 4, reference number 33), the substantially vertical sidewalls being formed of ceramic (English abstract), at least one light-reflective metallic coating disposed over at least portions of the sidewalls (Fig. 4), and the step of coating the at least portions of the sidewalls with the at least one light-reflective metallic coating (Fig. 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the configuration of Kyocera in the apparatus of Ishinaga to make the apparatus produce more light. See the English abstract of Kyocera.

Concerning claim 14, Ishinaga discloses the step of depositing epoxy as the optically transparent material in the cavity (column 4, lines 25-30).

Applicants have amended claims 1, 8 and 13 herein. Reference to claim 1 as amended herein is instructive, as it contains limitations similar to those found in all the other claims that yet remain pending in the present application. With further reference to Figs. 2D and 4 of the present application, claim 1 recites the following:

- (a) A standalone light emitting diode package, comprising:
- (b) a housing comprising substantially vertical sidewalls and a substrate;
- (c) the sidewalls and the substrate defining a cavity having a bottom, the substrate being located at the bottom of the cavity, the substrate and the vertical sidewalls being contiguous and continuous with one another at the intersections thereof;
- (d) the housing forming a single unitary piece of ceramic;
- (e) at least one light-reflective metallic coating disposed over at least portions of the sidewalls and the substrate;
- (f) a light emitting diode mounted on or in the substrate, and
- (g) an optically transparent material disposed in the cavity and covering the light emitting diode;
- (h) wherein the ceramic composition and configuration of the housing and the light-reflective coating cooperate to minimize light leakage through, into or out of the housing when the light emitting diode is energized;
- (i) the metallic coating reflects light incident thereon in a predetermined direction, and

- (j) the optically transparent material protects the light emitting diode.

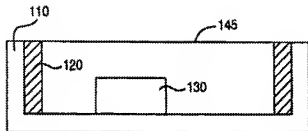


Figure 2D

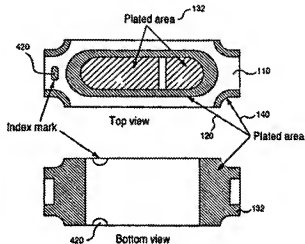


Figure 4

Figs. 2D and 4 of the present application

Fig. 2D set forth above shows optically transparent material 145 disposed in the cavity in which light emitting diode 130 is located, and substantially vertical sidewalls 110 being contiguous and continuous with the substrate at the intersections thereof. Fig. 2D also shows that the housing comprising the substrate and the substantially vertical sidewalls 110 is formed from a single unitary piece of ceramic. Fig. 4 set forth above shows plated area 120 disposed on portions of substrate 110 for reflecting light from an LED in a predetermined direction.

Reference to Fig. 3 of the Ishinaga reference and corresponding portions of the specification thereof shows that substrate 1A is formed separately from casing 5, and that casing 5 is formed of a different material (a polycarbonate resin) than is substrate 1A (formed from a polyimide resin or ceramic). Moreover, Ishinaga discloses inner-wall surface 5a as being parabolic or curved in shape such that the amount of space available at the base of casing 5 for the mounting of a light source on substrate 1A is limited. Finally, no reflective coating is disposed over portions of substrate 1A of Ishinaga.

Reference to Fig. 4 of the Kyocera reference and corresponding portions of the specification thereof shows that that no light-reflective coating is disposed over the bottom surface of cavity 33a. Instead, Kyocera's Fig. 4 shows electrically conductive strip 31a disposed at the bottom of cavity 33a and connected to LED 35. Vias and electrical conductors 32 route electrical power to LED 35 through substrate 31 and clearly serve no light-reflecting function whatsoever. Moreover, no optically transparent material is disposed in cavity 33a of Kyocera. Finally, sidewalls 33 and substrate 31 are not contiguous, continuous and uninterrupted respecting one another at the intersections thereof because the housing comprising such sidewalls and substrate is not formed from a single unitary piece of ceramic.

Reference to the claim 1 as presented herein will show that this claim, and all other claims yet pending in the present application, contain many limitations *disclosed nowhere* in the cited Ishinaga and Kyocera references.

More particularly, reference to the claim 1 as presented hereinabove shows that elements (c) [the sidewalls and the substrate defining a cavity having a bottom, the substrate being located at the bottom of the cavity, the substrate and the vertical sidewalls being contiguous, continuous and uninterrupted respecting one another at the

intersections thereof], (d) [the housing forming a single unitary piece of ceramic], (e) [at least one light-reflective metallic coating disposed over at least portions of the sidewalls and the substrate], and (h) [wherein the ceramic composition and configuration of the housing and the light-reflective coating cooperate to minimize light leakage through or into the housing when the light emitting diode is energized] are simply not disclosed, described, hinted at or suggested anywhere in the Ishinaga or Kyocera references, alone or in combination. In other words, at least four separate but inter-related structural elements recited in the still-pending claims are missing from the cited references.

Thus, neither cited reference ***discloses a housing comprising substantially vertical sidewalls and a substrate formed form a single unitary piece of ceramic.***

Neither cited reference discloses ***at least one light-reflective metallic coating disposed over at least portions of the sidewalls and the substrate.***

And neither reference discloses ***a ceramic composition and configuration of a housing and a light-reflective coating that cooperate to minimize light leakage through or into the housing when a light emitting diode is energized.***

The Applicants have discovered that a certain novel combination of structural and electronic elements combined in a certain order and arranged in a certain manner are required to produce the beneficial effects of the present invention. Those elements and arrangements are neither disclosed nor suggested anywhere in the Ishinaga or Kyocera references, and accordingly cannot be *prima facie* obvious.

Merely asserting that "would be obvious to try" the invention by making reference to the vertical sidewalls of Kyocera and the light-permeable member 50 of Ishinaga, while essentially creating other claimed elements out of whole cloth without referring to any specific

portions of the cited references to establish a motivation for combining elements or functionality disclosed therein, would not establish a *prima facie* case of obviousness. In going from the prior art to the claimed invention, one cannot base obviousness on what a person skilled in the art might try or find obvious to try, but rather must consider what the prior art would have lead a person skilled in the art to *do*.

There is no incentive, teaching or suggestion in the Ishinaga or Kyocera references to produce the invention now recited in claims 1 and 3-14. The mere fact that the cited Ishinaga or Kyocera references could, with the benefit of hindsight, produce something vaguely similar to the present invention does not make the modification obvious, or suggest the desirability of the modification required to arrive at the present invention. Indeed, this conclusion is buttressed by the fact that numerous elements and limitations are missing in the Ishinaga and Kyocera references in respect of claims 1 and 3-14 set forth herein (namely, elements (c), (d), (e) and (h) contained in all of claims 1 and 3-14 as amended herein, and as enumerated above).

It is well settled that a motivation to combine elements or limitations disclosed in disparate references *must be found within the references themselves or from pertinent sources of extrinsic information*, and that such a motivation does not arise, as here, by merely identifying a collection of disparate piece parts in different references, and then asserting it would have been obvious to take such disparate elements and limitations and add many others thereto to arrive at the presently claimed invention.

In such a context, and as pointed out above, it is particularly noteworthy that the cited Ishinaga and Kyocera references ***disclose nothing concerning some of the problems solved by the present invention***, such as facilitating the high-speed and economic manufacture of ceramic housings for LED packages by stamping

housing sidewalls and a substrate from a single unitary piece of ceramic, reducing light leakage from an LED package, increasing the brightness of light emitted by an LED package, permitting LED packages of equivalent brightness to be made smaller, decreasing power requirements for an LED package, permitting a greater number of multiple LEDs to be mounted in an LED package than would otherwise be possible, and permitting manufacturing of an LED package to be carried out at high temperatures.

There is no suggestion of what direction any experimentation should follow in the Ishinaga and Kyocera references to obtain the invention recited in claims 1 and 3-15. Accordingly, the result effective variables, for example providing a ceramic housing formed from a single unitary piece of ceramic and disposing a reflective coating over at least portions of the substantially vertical sidewalls and the substrate thereof, are not known to be result effective. Thousands or millions of attempts at variations might be made before arriving at the desired improvement. Thus, to say that it is obvious to read the Ishinaga and Kyocera references and somehow arrive at the invention now recited in claims 1 and 3-14 is clearly not the test for obviousness.

The foregoing analysis also makes it clear that there is no basis in the art for modifying the teachings of the Ishinaga and Kyocera references to arrive at the invention now recited in claims 1 and 3-14. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. As pointed out in detail above, the Ishinaga and Kyocera references do not teach the problems associated with, or the sources of such problems, respecting facilitating the high-speed and economic manufacture of ceramic housings for LED packages by stamping housing sidewalls and a substrate from a single unitary piece of ceramic, reducing light leakage

from an LED package, increasing the brightness of light emitted by an LED package, permitting LED packages of equivalent brightness to be made smaller, decreasing power requirements for an LED package, permitting a greater number of multiple LEDs to be mounted in an LED package than would otherwise be possible, and permitting manufacturing of an LED package to be carried out at high temperatures.

When, as here, the prior art itself provides no apparent reason for one of ordinary skill in the art to make a modification or to combine references, an argument clearly does not exist that the claimed subject matter would have been obvious. Thus, using the applicants' own disclosure as a blueprint to reconstruct in hindsight the invention recited in claims 1 and 3-14 out of isolated teachings appearing in the prior art is clearly improper.

The results and advantages produced by the invention set forth in claims 1 and 3-14, and of which the cited Ishinaga and Kyocera references are utterly devoid, cannot be ignored simply because the claim limitations might be deemed similar to the otherwise barren prior art.

The foregoing analysis also makes it clear that many limitations appearing in claims 1 and 3-14 are simply not present in the Ishinaga and Kyocera references. When evaluating a claim for determining obviousness, ***all limitations of the claim must be evaluated.*** Under §103, claims 1 and 3-14 cannot be dissected in turn, the various individual elements recited in the claims excised, and then the remaining portions of the mutilated claims declared to be unpatentable. The basic rule of claim interpretation of reading the claims as a whole must be followed. Accordingly, the Ishinaga and Kyocera references may not properly be used as a basis for rejecting claims 1 through 10 under §103.

The functions, ways and results provided by the devices and methods disclosed in the Ishinaga and Kyocera references are completely different from those provided by the presently claimed invention. The LED packages disclosed in the Ishinaga and Kyocera references function to emit light without reflecting light from reflective coatings disposed on the substrates thereof, and employ multiple components to form an LED package housing. In respect of the many problems solved by the present invention, the results provided by Ishinaga and Kyocera are identical: the structures disclosed in both references, or the structures that might somehow be produced by combining the elements disclosed in both references, are ***incapable of preventing or reducing light leakage from the LED packages thereof in respect of prior art devices, and are much more difficult, expensive and time-consuming to manufacture.*** Finally, there is no combination of disparate elements from the Ishinaga and Kyocera references that could possibly result in the present invention. Instead, and in a light most favorable to the mythical person of ordinary skill in the art, combining elements from those two references might result in an LED package having a housing formed from separate components (e.g., a substrate having separate sidewalls mounted thereon), a substrate having no reflective coating disposed thereon, and an LED package exhibiting no decreased light leakage in respect of prior art devices.

For all the foregoing reasons and more, the presently claimed invention is not *prima facie* obvious in view of the Ishinaga or Kyocera references, alone or in combination.

- (3) Claims 4 and 10 as amended herein are not obvious over Ishinaga in view of Kyocera and further in view of Zou

In rejecting claims 4 and 10 as being obvious over Ishinaga in view of Kyocera and further in view of Zou, the Examiner stated:

Concerning claims 4 and 10, Ishinaga and Kyocera do not disclose using silver as a reflective coating, Zou et al. discloses the metallic coating comprising silver (column 6, lines 10-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the silver coating of Zou et al. in place of the reflective coating of Kyocera to achieve "high output irradiance[.]" See column 1, lines 50-65, of Zou et al.

Reference to the portions of the Zou patent cited by the Examiner shows that there is no disclosure of information that adds anything substantive to the deficiencies of the Ishinaga and Kyocera references described in detail above. Indeed, the referenced portions of the Zou patent state, respectively, "a highly-efficient, linear illumination source with high output irradiance and radiance from a narrow opening is needed" and "[e]xamples of specular reflective materials include, but are not limited to, Silverlux, a product of 3M, and other carrier films of plastic which have been coated with a thin layer such as silver, aluminum or gold." Col. 1, lines 60-65 and col. 6, lines 10-15 of the Zou patent.

Accordingly, and in view of the many limitations missing from the Ishinaga, Kyocera and Zou references, alone or in combination, and the completely barren nature of such references respecting the many problems solved by the presently-claimed invention (e.g., reducing light leakage from an LED package), claims 4 and 10 cannot be prima facie obvious over or in view of any combination of such references.

- (4) Claims 7 and 13 as amended herein are not obvious over Ishinaga in view of Kyocera and further in view of Huang

In rejecting claims 7 and 13 as being obvious over Ishinaga in view of Kyocera and further in view of Huang, the Examiner stated:

Regarding claims 7 and 13, Ishinaga and Kyocera do not disclose the cavity being formed to contain a plurality of LEDs. Huang discloses the ceramic cavity being formed to contain a plurality of LEDs (column 4, lines 62-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the configuration of Huang in the apparatus of Ishinaga and Kyocera to increase light output per apparatus.

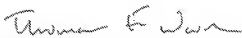
Reference to the portions of the Huang patent cited by the Examiner shows that there is no disclosure of information that adds anything substantive to the deficiencies of the Ishinaga and Kyocera references described in detail above. Indeed, the referenced portions of the Huang patent state "[e]ach of the light emitting diode modules 12, 13, 14 and 15 includes a plurality of light emitting diodes, the light beams generated by the diodes in the same of the light emitting diode modules 12, 13, 14, 15 having a substantially uniform wavelength band." Col. 4, lines 62-67 of the Huang patent.

Accordingly, and in view of the many limitations missing from the Ishinaga, Kyocera and Huang references, alone or in combination, and the completely barren nature of such references respecting the many problems solved by the presently-claimed invention (e.g., reducing light leakage from an LED package), claims 7 and 13 cannot be prima facie obvious over or in view of any combination of such references.

V. Summary

Claims 1 and 3-14 remain pending in the application, and are believed to be in condition for allowance. Examination of the application as amended is requested. The Examiner is respectfully requested to contact the undersigned by telephone or e-mail with any questions or comments she may have.

Respectfully submitted,
Weng et al.
By their attorney



Thomas F. Woods
Registration No. 36,726

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Woods Patent Law
P.O. Box 2528
Lyons, Colorado 80540-2528
Tel: (303) 823-6560
Fax: (303) 823-6594
E-mail: tom@woodspatentlaw.com